

**EPA Superfund
Record of Decision:**

**ELLSWORTH AIR FORCE BASE
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ELLSWORTH AFB, SD
05/10/1996**

Final

Record of Decision for
Remedial Action at Operable Unit 2
Ellsworth Air Force Base, South Dakota

United States Air Force
Air Combat Command
Ellsworth Air Force Base

April 1996

Air Force Project No. FXBM #947002

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1.0 DECLARATION FOR THE RECORD OF DECISION (ROD)

1.1 SITE NAME AND LOCATION

Operable Unit 2 (OU-2), Landfill Nos. 1 and 6, Ellsworth Air Force Base (EAFB), National Priorities List (NPL) Site.

Meade and Pennington Counties, South Dakota.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document describes EAFB's selected remedial action for OU-2, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the contents of the Administrative Record for OU-2, EAFB. The US Environmental Protection Agency (EPA) and the South Dakota Department of Environment and Natural Resources (SDDENR) concur with the selected remedial action.

1.3 ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from OU-2, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 DESCRIPTION OF SELECTED REMEDY

Twelve contaminated areas, or operable units (OUs), have been identified at EAFB. This ROD is for a remedial action at OU-2 and is the 5th ROD for EAFB.

For Landfill No. 1, the selected alternative, and earth cover and institutional controls, includes the following major components:

- Constructing an earth cover, capable of sustaining perennial vegetation, over those areas of the landfill that are not adequately covered. Filling in low areas and grading the entire landfill area to provide for positive drainage off the site;
- Institutional controls for the landfill area;
- Long-term ground-water monitoring; and,
- Long-term maintenance of soil cover.
- Realignment and lining of the storm-water channel.

For Landfill No. 6, the selected alternative, institutional controls, includes the following major components:

- Institutional controls for the landfill area;
- Long-term ground-water monitoring; and,
- Long-term maintenance of existing cover.

1.5 STATUTORY DETERMINATION

The selected remedies are protective of human health and the environment, complies with Federal and the State of South Dakota requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable for OU-2. However, because treatment of the principal threats of the OU was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element. The size of the landfills and the fact that there are no apparent on-site hot spots that represent major sources of contamination preclude a remedy in which contaminants could be excavated and treated effectively.

Because this remedy will result in low levels of hazardous or potentially hazardous substances remaining onsite beneath the landfill covers, a review will be conducted no less than every five years after signing of the ROD to ensure that the remedy continues to provide adequate protection of human health and the environment. If the results of the review indicate that conditions at OU-2 have changed, the remedies may be modified to reflect any changes.

1.6 SIGNATURE AND AGENCY CONCURRENCE ON THE REMEDY

JACK W. MCGRAW
Acting Regional Administrator
US Environmental Protection Agency Region 8

Date

NETTIE H. MYERS, Secretary
Department of Environment and Natural Resources
State of South Dakota

Date

1.6 SIGNATURE AND AGENCY CONCURRENCE ON THE REMEDY

BRETT M. DULA
Lieutenant General, USAF
Vice Commander

Date

2.0 DECISION SUMMARY

2.1 SITE NAME AND LOCATION

EAFB is a U.S. Air Force (USAF) Air Combat Command (ACC) installation located 12 miles east of Rapid City, South Dakota, and adjacent to the small community of Box Elder (Figure 2-1).

EAFB covers approximately 4,858 acres within Meade and Pennington Counties and includes runways and airfield operations, industrial areas, and housing and recreational facilities (Figure 2-2). Open land, containing a few private residences, lies adjacent to EAFB on the north, south, and west, while residential and commercial areas lie to the east of the Base.

2.2 OU-2 DESCRIPTION/HISTORY AND REGULATORY OVERSIGHT ACTIVITIES

2.2.1 Description/History

EAFB was officially activated in July 1942 as the Rapid City Army Air Base, a training facility for B-17 bomber crews. It became a permanent facility in 1948 with the 28th Strategic Reconnaissance Wing as its host unit. Historically, EAFB has been the headquarters of operations for a variety of aircraft, as well as the Titan I Intercontinental Ballistic Missile, and the Minuteman I and Minuteman II missile systems. The Air Force has provided support, training, maintenance, and/or testing facilities at EAFB. Presently, the 28th Bombardment Wing (B-1B bombers) is the host unit of EAFB.

The operable unit 2 (OU-2) study area consists of Landfill No. 1, Landfill No. 6, the drainage channel in the western portion of Landfill No. 1, and the drainage channel near Landfill No. 6, which includes Pond 002.

Landfill No. 1 is approximately 21.5 acres in size and is located at the southern boundary of EAFB (Figure 2-3). The landfill was active from the early 1940s to 1946 and was used to dispose of a variety of wastes including Base refuse, incinerator ash, sludge, oil, and possibly liquid industrial wastes. Hardfill debris was also disposed of at Landfill No. 1.

Aerial photo analysis conducted by the EPA from historical photos (1938 to 1990) indicated the types of disposal practices at Landfill No. 1. Through interpretation of these photographs, landfill materials appear to have been placed in trenches in the eastern two-thirds of the landfill (Figure 2-3). The western third of the landfill appears to have been used to dispose of primarily hardfill materials. This is evidenced by the presence of exposed rubble piles in this area. Hardfill has been placed along the embankment of the drainage channel in the western portion of the landfill. Other disposal practices at Landfill No. 1 include open burning of refuse and debris.

In general, the surface topography of Landfill No. 1 slopes in a southeasterly direction from Kenny Road to the southern Base boundary. An intermittent storm-water channel flows adjacent to and through the western portion of the landfill area. The storm water flowing through the channel originates from areas upstream of OU-2. Landfill No. 6 is approximately 0.5 acre in size and is located northeast of Landfill No. 1 on the north side of Kenney Road (Figure 2-3). Landfill No. 6 was used from 1962 to 1965 and primarily received general Base refuse. Waste oil, fuel, and solvents may also have been disposed of at this location. However, no direct physical evidence of these chemicals was found at Landfill No. 6 during the 1993/1994 remedial investigation (RI) field activities.

Landfill No. 6 is situated on an eastward sloping hillside just west of a small pond designated as Pond 002. Surface drainage from Landfill No. 6 flows eastward toward Pond 002. In addition to runoff from the landfill, Pond 002 receives runoff from the western one-half of the runway and adjacent areas, and from storm water drains located on the alert apron. Outflow from Pond 002 empties into a small ephemeral stream that flows to the south.

A shallow aquifer has been identified at depths of 10 to 50 ft beneath the ground surface at various areas of the Base. At OU-2, shallow ground water was found at depths ranging from 10 to 25 ft at Landfill No. 1, and 15 to 20 ft at Landfill No. 6. In general, the shallow ground water at EAFB is classified as having a beneficial use as a drinking water supply suitable for human consumption (ARSD Chapter 74:03:15, Groundwater Quality Standards), but is not currently being used. The shallow aquifer may also discharge to the surface.

Deeper bedrock aquifers also exist beneath EAFB. These deeper aquifers are separated from the shallow aquifer by 800 feet of low-permeability clays and silts. In the past, EAFB utilized these deeper aquifers for its water supply. Presently, EAFB obtains its potable water from the Rapid City Municipal Distribution System.

2.2.2 Regulatory Oversight Activities

Environmental investigation activities at EAFB were initiated by the Air Force in 1985 through an Installation Restoration Program (IRP) Phase I Installation Assessment/Records Search and Phase II, Confirmation/Quantification. The Phase I study, dated September, 1985, identified a total of 17 locations at EAFB where releases involving hazardous substances potentially occurred.

In Phase II of the IRP investigation, field activities included soil vapor surveys, geophysical surveys, surface and subsurface soil sampling, ground-water sampling, ground-water hydrologic testing, and ecological investigations.

On August 30, 1990 (55 Federal Register 35509), EAFB was listed on the EPA's NPL. A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, EPA, and the State of South Dakota (State) and went into effect on April 1, 1992. The FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions for EAFB in accordance with CERCLA, as amended by SARA, and the NCP. It also states the oversight procedures for EPA and the State to ensure Air Force compliance with the specific requirements. The FFA identified 11 site-specific operable units (OUs) and a Base-wide ground-water OU. The Base-wide ground-water OU is primarily used to address contaminated ground water that was not addressed during an investigation of a site-specific OU. Listing on the NPL and execution of the FFA required the U.S. Air Force to perform a remedial investigation/feasibility study (RI/FS) to investigate to 12 operable units. In 1993 and 1994, an extensive RI field program was conducted to characterize conditions at OU-2. The program included drilling and sampling of boreholes, installation of monitoring wells, ground-water sampling, geotechnical analysis of soil samples, ecological evaluation, assessment of human health risks, and review and compilation of previous IRP investigations. Collection and laboratory analysis of soil, ground-water, surface-water and sediment samples were included in the RI field program.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community relations activities that have taken place at EAFB to date include:

- FFA process. After preparation of the FFA by the USAF, EPA, and SDDENR, the document was published for comment. The FFA became effective April 1, 1992.
- Administrative Record. An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.
- Information repositories. An Administrative Record outline is located at the Rapid City Library (public repository).
- Community Relations Plan (CRP). The CRP was prepared and has been accepted by EPA and the State of South Dakota and is currently being implemented. An update to this plan will be prepared in 1996.
- Restoration Advisory Board (RAB). The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to USAF, EPA, and State oversight personnel, the RAB includes community leaders and local representatives from the surrounding area.
- Mailing list. A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.
- Fact sheet. A fact sheet describing the status of the IRP at EAFB was distributed to the mailing list addressees in 1992.
- Open house. An informational meeting on the status of the IRP and other environmental efforts at EAFB was held on May 6, 1993. An open house was held November 16, 1995 in conjunction with the Restoration Advisory Board meeting. Information on the status of environmental efforts at EAFB was provided at the open house.
- Newspaper articles. Articles have been written for the Base newspaper regarding IRP activity.
- Proposed Plan. The proposed plan on this action was distributed to the mailing list addressees for their comments.

A public comment period was held from September 18 to October 18, 1995, and a public meeting was held on September 26, 1995. At this meeting, representatives from EAFB answered questions about the remedial action. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

This ROD is based on the contents of the Administrative Record for OU-2, in accordance with the CERCLA, as amended by SARA, and the NCP. The RI/FS reports and the Proposed Plan for OU-2 provide information about OU-2 and the selected remedy. These documents are available at the Information Repositories at EAFB and the Rapid City Public Library.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

The FFA identified 11 site-specific OUs and a Base-wide ground-water OU. The 12 operable units are identified as follows:

OU-1	Fire Protection Training Area
OU-2	Landfill Nos. 1 and 6
OU-3	Landfill No. 2
OU-4	Landfill No. 3
OU-5	Landfill No. 4
OU-6	Landfill No. 5
OU-7	Weapons Storage Area
OU-8	Explosive Ordnance Disposal Area (Pramitol Spill)
OU-9	Old Auto Hobby Shop Area
OU-10	North Hanger Complex
OU-11	Base-wide Ground Water
OU-12	Hardfill No. 1

This ROD documents the selected remedial action (RA) at OU-2 and is the 5th ROD for EAFB. The remedial action objectives (RAOs) are to reduce the potential risks posed by contaminants in surface soils and to reduce the mobility of potential contaminant in the landfills through containment.

The development of alternatives for the landfills was conducted under EPA's Presumptive Remedies Approach [Presumptive Remedies: Policy and Procedures (OSWER Directive 9355.0-47FS); Presumptive Remedy for CERCLA Municipal Landfill Sites (OSWER Directive 9355.0-49FS)]. In using this approach, selecting an alternative for remediation is streamlined by using preferred technologies based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation. The presumptive remedy stipulates containment as the appropriate remedy for landfills. The response action, containment by covering, would reduce risk associated with the ingestion, dermal contact, and inhalation exposure pathways. The area over which remediation goals will be achieved after remediation is complete is defined as the area of attainment, and is based on the RAOs. For OU-2, the area of attainment consists of the identified boundaries of Landfills No. 1 and 6. This includes the areas of the landfills not meeting appropriate State of South Dakota closure standards. The remedial investigation determined that Landfill No. 6 presently meets the appropriate closure standards. Measures to address leachate or gas collection were not considered since identified wastes placed in the landfills are not likely to produce significant amounts of gas, nor does the waste typify that which would normally be associated with significant leachate production. Further, analytical results indicate that chemicals detected in the ground water beneath Landfill No. 1 have not moved beyond the boundaries of the landfill in the 30 years since it has been used.

2.5 SITE CHARACTERISTICS

This section describes the presence and distribution of contaminants at OU-2 as a result of past activities.

2.5.1 Soils

Volatile Organic Compounds (VOCs)

Low concentrations of VOCs were detected in surface and subsurface soil samples collected at Landfill No. 1, the majority of which were detected in subsurface samples. The most common VOCs detected were benzene, toluene, ethylbenzene, xylene (BTEX), and acetone. Trichloroethene (TCE) and dichloroethene (DCE) were also detected. The highest reported values for these compounds were found in samples collected from suspected trench locations and are believed to be the result of past disposal activities at OU-2. There were no VOCs in soil samples collected from Landfill No. 6. VOCs were evaluated in the risk assessment for Landfill No. 1.

Semivolatile Organic Compounds (SVOCs)

Several SVOCs were detected in surface and subsurface soil samples collected at OU-2, mostly at Landfill No. 1. The most frequently reported SVOCs in soils were polynuclear aromatic hydrocarbons (PAHs). The most frequently reported PAH in surface soil samples at OU-2 was benzo(a)anthracene. Naphthalene, 2-methylnaphthalene, P-cresol, and chrysene were the most frequently reported PAHs in subsurface soils. No specific pattern of PAH contamination exists in the surface or subsurface soil. PAHs are commonly found in the environment at industrial sites. The PAHs detected in surface soils are likely associated with overall Base-wide activities rather than past disposal at the landfills. The subsurface soil contamination may be associated with disposal of certain items such as waste oil or asphalt material. Because of uncertainties associated with characterizing the contents of landfills, the PAHs were evaluated in the risk assessment.

Total Petroleum Hydrocarbons (TPH)

Total petroleum hydrocarbon, as jet fuel, was detected in one surface and one subsurface sample collected at Landfill No. 1. TPH was not detected in soils at Landfill No. 6. The concentration of TPH in the surface soil sample was above the State action level for petroleum contaminated soils. TPH was also detected in samples collected from beyond (south of) the Base boundary. This TPH is related to a leak in the fuel line located along the southern boundary of OU-2 and not related to past disposal activities at OU-2. This fuel contamination is being addressed separately by the Air Force and the remediation is not included as part of OU-2.

Pesticides

Low concentrations of pesticides were reported in several surface and subsurface soil samples at Landfill No. 1 and one surface sample at Landfill No. 6. The pesticides in surface soil samples are likely from past pesticide application practices at EAFB, not from disposal in the landfills. Pesticides detected in the subsurface may be from pest-management activities or disposal activities. Large-scale disposal of pesticides in OU-2 landfills is not suspected. Supporting this conclusion is that the ground water beneath Landfill No. 1 contained only low concentrations of pesticides. There were no pesticides detected in ground water at Landfill No. 6. Pesticides were included in the evaluation during the risk assessment.

Inorganic Contaminants

The concentrations of several inorganic compounds in the soil samples exist at levels above background concentrations. This is believed to be due to a combination of landfill activities and variations in the concentrations of naturally-occurring compounds in the soil. No specific pattern of inorganic contamination exists in the soil. The risk assessment indicated that no unacceptable risk exists for these inorganic compounds in soils.

2.5.2 Sediment

Organic Contaminants

Organic contaminants reported in sediment samples included SVOCs and pesticides. The most commonly reported SVOCs in sediment were PAHs including naphthalenes, pyrenes, anthracenes, and fluoranthenes. Pesticides were reported in samples collected from both the east and west drainages. Reported pesticides are considered to be a result of historical Base-wide pest management practices and are not considered to be a result of past disposal at OU-2.

Sample results from certain locations indicate that the contaminants detected in sediment originated from surface water runoff from other areas of EAFB and cannot be specifically linked to landfill activities. However, these contaminants were evaluated in the risk assessment.

Inorganic Contaminants

Inorganic compounds were detected in the sediment samples from the drainage channels. Inorganic compounds are within the range of naturally-occurring concentrations and are believed to be the result of natural variations in geologic deposits. However, due to the uncertainties in determining the contents of landfills, the inorganic compounds were also evaluated in the risk assessment.

2.5.3 Ground Water

Ground-water sample results indicate that ground-water contamination at OU-2 is confined within the limits of Landfill No. 1. Analytical data indicate that contaminants in the ground water beneath OU-2 have not moved beyond the boundaries of the landfill in the 30 years since it ceased operation. Ground-water contamination off-Base (to the south) is related to a fuel line rupture that occurred in 1989 and is not related to landfill activities. Remediation of off-Base fuel contamination is being addressed through State of South Dakota petroleum release regulations (ARSD Chapter 74:03:33).

VOCs

Several VOCs were detected in ground-water samples collected at OU-2. The most notable VOCs detected in samples collected within Landfill No.1 include benzene, total BTEX, TCE, and DCE. TCE and DCE were detected above Maximum Contaminant Levels (MCLs). These VOCs are believed to be the result of past waste-disposal activities at Landfill No. 1. Landfill No. 1 ceased operation in 1964, and chemicals detected beneath the landfill have not moved beyond its boundaries in the 30 years since it has been used. There were no VOCs detected in ground-water samples at Landfill No. 6. VOCs in the ground water were evaluated in the risk assessment.

Other Organic Contaminants

Other organic contaminants detected in ground-water samples collected at OU-2 include low concentrations of SVOCs (only two) and pesticides. The exact source of pesticides is not known. Historical use of pesticides at the Base has been documented and it is believed that pesticides detected in sediment at OU-2 are the result of past pest management activities. There are no known records of disposal of pesticide products in the OU-2 landfills. These compounds were included in the evaluation during the risk assessment.

Inorganic Contaminants

Inorganic compounds were detected in ground-water samples, at concentrations exceeding background. Also, five inorganic compounds (cadmium, nickel, lead, antimony, and selenium) were detected above MCLs. The source of the high concentration inorganic compounds at OU-2 is not known. Samples collected upgradient and side gradient of Landfill No. 1 also contained high concentrations of inorganic compounds indicating that the source of these compounds is not related to activities at the landfills. The distribution of inorganic compounds detected in OU-2 samples indicates that the high concentrations are the result of natural variations in geologic deposits. However, because of uncertainties associated in determining landfill characteristics, inorganic compounds were-evaluated in the risk assessment.

2.5.4 Surface Water

Organic Contaminants

Surface water samples were taken from the surface water bodies at OU-2. Several organic contaminants were detected in surface water samples taken from the drainage channel in the western portion of Landfill No. 1, and upstream and downstream of Pond 002. There were no VOCs or pesticides detected in the surface water samples. Only low concentrations of three SVOCs were detected in surface water samples at OU-2.

Inorganic Contaminants

Many inorganic compounds were detected in the surface water samples. The concentrations of several of these compounds (arsenic, iron, manganese, nickel, and selenium) were detected at concentrations that exceeded Federal Ambient Water Quality Criteria (FAWQC) and State Water Quality Standards. The highest frequency of compounds reported above FAWQC was in samples collected upgradient of OU-2, which indicates that they are not related to activities at the landfills. Inorganic compounds were evaluated in the risk assessment.

2.6. SITE RISK SUMMARY

2.6.1 Human Health Risks

Risk Assessment Process

The assessment of human health risks for this OU considered the following topics:

- (1) Chemicals of concern (COCs) in ground-water, surface water, sediment, and soil samples taken at OU-2;
- (2) Current and future land-use conditions;
- (3) Potential environmental pathways by which populations might be exposed;
- (4) Estimated exposure point concentrations of COCs;
- (5) Estimated intake levels of the COCs;
- (6) Toxicity of the COCs; and
- (7) Uncertainties in the assessments of exposure, toxicity, and general risks.

Noncarcinogenic and carcinogenic risks were calculated for the following five potential exposure groups at OU-2:

- (1) Current EAFB maintenance personnel who ingest or have dermal contact with surface soil while mowing grass onsite;
- (2) The future adult living onsite who ingests or has dermal contact with surface soil, or ingests or showers with ground water;
- (3) Future adolescents living onsite who are exposed to surface water and sediment through wading; and
- (5) Future adult construction workers who perform excavation activities.

A quantitative risk assessment was performed for the ground water, surface water, soil, sediment, and air. The risk assessment evaluated potential effects on human health posed by exposure to contaminants within OU-2. Carcinogenic risks were estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential cancer-causing chemical. The acceptable risk range expressed as a probability is one cancer incidence in ten thousand people to one cancer incident in one million people. This level of risk is also denoted by 1×10^{-4} to 1×10^{-6} . Risks within the acceptable risk range may or may not warrant remedial action depending upon site-specific circumstances. Risks below this range cannot be differentiated from the background occurrence of cancer in human populations. Risk calculated in a risk assessment are excess (i.e., over background) cancer risks due to exposure from contaminants.

Noncarcinogenic health risks are evaluated using hazard index (HI). If the hazard index is less than or equal to one, the contaminant concentration is considered an acceptable level and generally assumes that the human population may be exposed to it during a 30-year period without adverse health effects.

Risk Assessment Results

The risk assessment for OU-2 indicated that the carcinogenic risk slightly exceeded the acceptable range only from ingestion of ground water containing arsenic and beryllium. Arsenic and beryllium are considered naturally occurring at OU-2. All other quantified carcinogenic risks were within the acceptable risk range.

Part of the remaining site risk includes risks from exposure to surface soil contaminants. The chemicals which contributed the majority of risk in the soil were PAHs. Benzo(a)pyrene, a PAH, is the primary contaminant identified in the risk assessment as contributing to risk from soils. However, only one surface soil and two subsurface soil samples actually contained concentrations of benzo(a)pyrene that are of concern. Due to the heterogeneity of the landfill contents, uncertainty is associated with the calculated risk values for the surface soil.

Benzo(a)pyrene was also the primary chemical contributing to carcinogenic risk in the sediments at OU-2. Five of seven sediment samples contained benzo(a)pyrene at concentrations that are of concern. However, the results of the risk assessment indicate that risk due to exposure to contaminants in sediments at OU-2 is within the acceptable risk range. It is typical for compounds in the surface soil to wash into adjacent drainages and to settle or become trapped in the drainage areas. Remedial action for the drainage areas outside of the landfill boundaries is not warranted.

The risk assessment for OU-2 indicated that the only noncarcinogenic risk resulting in an HI above 1.0 was from ingestion of ground water containing arsenic. Arsenic detected in samples throughout the Base

is considered to be naturally occurring.

Results of the risk assessment indicated that surface water was not a media of current concern. Chemicals detected in the ground water which contributed to excess risk are considered to be naturally occurring. Therefore, remedial action is not warranted for the ground water and surface water at this time.

Risk Summary

Remedial action is warranted for the landfills based on the potential risk to human health from future releases of hazardous substances from the landfills. Contaminants in the landfills may leach downward to contaminate the underlying ground water. Off-Base residents may then ingest or come in contact with the contaminated ground water. Also, the surface of the landfills may erode, thus exposing off-Base resident to contaminants in both surface water and air.

Due to the potential heterogeneity of the waste materials present within the landfills, a complete characterization of waste materials present was not possible during the RI. This adds a degree of uncertainty to the risk assessment for the landfill contents. Rather than attempting to fully characterize landfill contents and gain more certainty in the risk assessment for the landfill contents, the Air Force utilized guidance developed by EPA titled Presumptive Remedy for CERCLA Municipal Landfill Sites (OSWER Directive 9355.0-49FS). The presumptive remedy for landfills is onsite containment of landfill contents. Using the presumptive remedy strategy, a quantitative risk assessment is not necessary to evaluate whether the containment remedy addresses all exposure pathways and contaminants potentially associated with a landfill. Rather, all potential exposure pathways can be identified using the conceptual site model and compared to the pathways addressed by the presumptive remedy. Containment of the landfill contents addresses exposure pathways and risks normally associated with landfills. The contaminant exposure pathways for the potential risks at OU-2 include (1) direct physical contact with the landfill contents, (2) consumption or contact with ground water that is or may become contaminated, (3) consumption or contact with potentially contaminated surface water, and (4) ingestion of potentially contaminated sediment in the drainages adjacent to and downgradient of the landfills. Actual or threatened releases of hazardous substances from OU-2, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, and the environment.

2.6.2 Ecological Risks

An ecological risk evaluation of OU-2 was based on a combination of data and literature reviews, field and laboratory analyses, analyte evaluation and screening, and preliminary risk screening. The pertinent findings are summarized below.

A variety of animal species may live, forage, or nest in OU-2 habitats. These species include various types of invertebrates, amphibians, birds, and mammals. Terrestrial vegetation and soil faunal communities do not reveal characteristics that indicate chemical-related impacts. This finding is consistent with the relatively low levels of contaminants in the soil.

Because of the altered natural environment at OU-2, rare, threatened, or endangered species are unlikely to utilize the area for more than brief, periodic habitat. Due to the low levels of contaminant concentrations, the contaminants do not pose an unacceptable risk to these species. In addition, the limited contact these species would have with the OU-2 area ensures unacceptable risk to a single individual will not occur.

Findings of the RI indicate that the contaminants at OU-2 are not altering the ecology to unacceptable levels. A Base-wide ecological risk assessment will be conducted as part of OU-11, and OU-2 will be included in this Base-wide evaluation.

2.7 DESCRIPTION OF ALTERNATIVES

Presumptive Remedy for CERCLA Municipal Landfill Sites, (OSWER Directive 9355.3-11FS) was the basis for the focused feasibility study (FS). The OSWER directive established containment of the contamination within landfills and the collection and treatment of landfill gas within the landfill boundary (if applicable) as the presumptive remedy for CERCLA municipal landfills.

Although not specifically identified as municipal landfills, Landfill Nos. 1 and 6 at OU-2 exhibit characteristics that make this presumptive remedy applicable. The landfills' contents at OU-2 do not have the characteristics to produce significant quantities of leachate or gases. The ground water contained concentrations of VOCs above MCLs, but these chemicals were only detected within the boundaries of Landfill No. 1. Since ground-water fluctuations over time have not caused transport of the

contaminants beyond the landfill boundary, the primary threat to cause chemical transport is future infiltration of precipitation through the landfill contents into the ground water. Also, at Landfill No. 1, the drainage channel running through the western portion of the landfill could potentially erode into the landfill and transport contaminants downstream. Ground water is not a pathway of concern at Landfill No. 6. The heterogeneity of the landfill contents causes uncertainties in the risk assessment. Although the use of the presumptive remedy focuses on containment of landfill contents, it will also serve to reduce the potential for infiltration of precipitation into a landfill.

Since Landfill No. 1 and Landfill No. 6 are distinct areas, alternatives were developed separately for each landfill; however, a similar approach (the presumptive remedy) was used to develop alternatives for each landfill and the list of potential alternatives was the same for both landfills (with the knowledge that additional consideration may be required for Landfill No. 1 because of the storm-water channel). Alternatives for Landfill No. 1 and Landfill No. 6 are summarized below. Since the identified risks at Landfill No. 6 are within the acceptable risk range and the existing cover complies with the State of South Dakota standards, only Alternatives 1 and 2 were considered for this landfill. Alternative 3 applies to Landfill No. 1 only.

Alternative 1 - No Action

The no action alternative represents the baseline condition at OU-2 and refers to taking no further action at OU-2. It is expected that existing maintenance (e.g., grass mowing) would be continued.

The no action alternative does not meet remedial action objectives for OU-2

Alternative 2 - Institutional Controls

- Implementing access restrictions.
- Restricting future land and ground-water use.
- Developing a long-term monitoring and maintenance plan for the landfill.

This alternative does not meet the remedial action objectives for Landfill No. 1; however, because of the present condition of Landfill No. 6, Alternative 2 would meet the remedial action objectives for Landfill No. 6.

Alternative 3 - Earth Cover/Institutional Controls (Landfill No. 1 only)

For Landfill No. 1, major components of Alternative 3 are:

- Implementing access restrictions.
- Restricting land and ground-water use.
- Realignment and lining of the storm-water channel.
- Developing a long-term monitoring and maintenance plan for the landfill.
- Installing an earth cover over the areas of the landfill that are currently not adequately covered (approximately 2-3 acres of rubble).
- Filling low areas and grading the entire area of the landfill to provide positive drainage off the area.

Alternative 3 meets the remedial action objectives for Landfill No. 1. The access restrictions, institutional controls, and the long-term monitoring and maintenance would be the same as described in Alternative 2.

2.8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The analysis of alternatives coupled with the use of the presumptive remedy combine for a narrower range of feasible approaches to address remedial activities at OU-2. Remedial Action Objectives (RAOs) were established for OU-2 to minimize the exposure potential and risk associated with the landfills. In meeting these RAOs, the alternatives must also comply with State and Federal ARARs. Specifically, remedial actions must meet State of South Dakota Waste Management Regulations for the disposal of solid waste (ARSD Chapter 74:27:15), Federal MCL levels for contaminants in ground water, and other ARARs

discussed in Section 2.8.2.

The RAOs for OU-2 are as follows:

- Provide protection against direct contact with contents of the landfills.
- Provide protection against ingestion of contaminated ground water at concentrations exceeding regulatory or risk-based goals.
- Minimize the potential for transport of contaminants in the soils and ground water beyond the boundaries of the landfills.

There are three general areas of concern for OU-2: Landfill No. 1, Landfill No. 6, and the surface water bodies. The levels of chemicals in the surface water bodies at OU-2 do not warrant remediation. The area of attainment is defined as the area which will achieve the remedial action objectives after remediation is completed. The area of attainment for OU-2 is the extent of Landfill No. 1, which is approximately 21.5 acres in size and Landfill No. 6, which is approximately 0.5 acres in size (Figure 2-3).

Pursuant to Section 40 CFR 300.430(e)(9)(iii), the remedial action to be implemented should be selected based upon consideration of nine evaluation criteria. These criteria are as follows:

1. Overall protection of human health and environment.
2. Compliance with applicable or relevant and appropriate requirements (ARARs).
3. Long-term effectiveness and permanence.
4. Reduction of toxicity, mobility, or volume of contamination.
5. Short-term effectiveness.
6. Implementability.
7. Cost.
8. State acceptance.
9. Community acceptance.

The following sections provide a brief review and comparison of the remedial alternatives according to EPA's evaluation criteria.

2.8.1 Overall Protection of Human Health and the Environment

The assessment of this criterion considers how the alternatives achieve and maintain protection of human health and the environment.

Alternative 1 does not reduce risk levels at Landfill No. 1 (there are no identified unacceptable risks at Landfill No. 6). Alternative 2 consists of using institutional controls to restrict access to the landfills and reduce exposures potentially associated with direct contact with landfill contents. This alternative does not involve ground-water or soil remediation; rather, it includes ground-water monitoring to determine if contaminants in the landfills area moving with or through ground water. Alternative 3 (applicable to Landfill No. 1 only) does not include treatment of landfill contents or ground water; however, it includes containment of the landfill contents through installation of new cover and improvement of existing cover, to reduce potential exposures. This alternative includes institutional controls similar to Alternative No. 2. Also, under this alternative, the drainage channel in the western portion of Landfill No. 1 would be realigned, stabilized, and lined with rip-rap to prevent erosion of the channel into the landfill and the potential transport of contaminants via the channel. Alternative 3 would provide the greatest overall protection to human health and the environment for Landfill No. 1.

2.8.2 Compliance with ARARs

Alternatives are assessed under this criterion in terms of compliance with ARARs. Applicable requirements include cleanup standards, standards of control and other substantive environmental protection requirements, and criteria or limitations promulgated under Federal or State laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Relevant and appropriate requirements address problems that do not specifically address a hazardous substance, pollutant, or remedial action. Rather, these requirements address problems or situations that are similar to those encountered at a particular CERCLA site. Therefore, the use of these requirements is suited to the environmental and technical factors at a particular site. ARARs are grouped into these

three categories:

- Chemical-Specific ARARs are health or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in establishment of the amount or concentration that may be found in, or discharged to, the environment.
- Location-Specific ARARs restrict the concentration of hazardous substances or the conduct of activities solely because they are in specific locations such as flood plains, wetlands, historic places, and sensitive ecosystems or habitats.
- Action-Specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous wastes.

A summary evaluation of Federal and State ARARs pertinent to this remedial action is provided in Table 2-1 at the end of Section 2.0 and a narrative discussion of compliance with ARARs is provided below for the alternatives considered.

Alternative 1 (No Action):

The No Action alternative does not comply with State solid waste landfill closure requirements. The OU-2 RI concluded that ground water that has been contaminated by the contents of Landfill No. 1 has not moved beyond the boundaries of the landfill; therefore, MCLs are not applicable. MCLs are applicable at the boundaries of the landfill and would have to be met if contaminated ground water moved out of the landfill at a later date. Ground water at Landfill No. 6 is in compliance with Federal MCLs. No State or Federal permits are required for this alternative.

Alternative 2 (Institutional Controls):

For Landfill No. 1, Alternative 2 does not comply with State solid waste landfill closure requirements. The OU-2 RI concluded that contaminated ground water is confined within the boundaries of Landfill No. 1, however, this alternative would not reduce the potential for future transport of contaminated ground water from beyond the landfill boundary.

For Landfill No. 6, Alternative 2 would meet State landfill closure guidelines. The conditions at the landfill presently meet State minimum cover requirements. Implementation of institutional controls would allow Landfill No. 6 to meet other State guidelines for landfills. Ground water at Landfill No. 6 is in compliance with Federal MCLs.

No Federal or State permits are required for this alternative.

Alternative 3 (Earth Cover/Institutional Controls, Landfill No. 1 only):

Alternative 3 would meet State of South Dakota Waste Management Regulations for the disposal of solid waste by providing a two-foot minimum earth cover capable of sustaining perennial vegetation; implementing institutional controls including maintaining access control; filling, grading, and contouring the site; maintenance of the cover and vegetation; and other requirements as set forth in ARSD Chapter 74:27:15. The State is Federally authorized for the Resource Conservation and Recovery Act (RCRA) Subtitle D Municipal Solid Waste Program (8 October 1993, 58 FR 52486). Information from the RI indicates that approximately two feet of cover material exists over most of Landfill No. 1, with the exception being in the western portion of landfill. Boring drilled during the pre-design study would be used to determine the quantity of material required to construct a cover of the required thickness. The pre-design study would also be used to determine the type of cover needed to reduce infiltration of precipitation through the landfill and ensure continued compliance with the MCLs. Based on the results of the pre-design study, either a single-layer earth cover or multi-layered reduced-permeability earth cover would be constructed. The selected cover would be constructed to comply with State requirements.

Long-term ground-water monitoring would be used to verify compliance with Federal MCLs (National Primary Drinking Water Regulations, 40 CFR 141.11-12) beyond the boundary of the landfill. By following the presumptive remedy approach, the MCLs are not considered ARARs for the ground water within the boundaries of the landfill.

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredge or fill material into waters of the United States. Section 404 is implemented through regulations set forth at 33 CFR parts 320 through 330 and 40 CFR Part 230. Based on the results of the pre-design study, to fully provide containment of the landfill contents, the drainage channel in the western portion of the Landfill No. 1 will need to be realigned and lined to prevent erosion. This may adversely affect an existing wetland. The Executive Order on Protection of Wetlands (E.O. No. 11,990) requires Federal Agencies to avoid, to

the extent possible, the adverse impacts associated with the destruction or loss of wetlands if a practical alternative exists. If the discharge of fill material into a water body cannot be avoided, the use of appropriate and practicable mitigation measures to minimize the adverse impact to the aquatic ecosystem will be required. Appropriate mitigation measures may be implemented during the remedial action. If lining this channel as part of Alternative 3 results in adverse impacts to wetlands at OU-2, an alternate area will be chosen for construction of a new wetland for the mitigation purposes. This ARAR will be met.

2.8.3 Long-Term Effectiveness and Permanence

The assessment of this criterion considered the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response action objectives have been met.

Alternative 1 would not provide additional effectiveness or permanence in reducing the potential for direct contact or ingestion of the surface soil or sediments. No further controls for the OU would be developed under this alternative.

For Landfill No. 1, Alternative 2 would be effective in reducing direct exposure to landfill contents by restricting access to the site. Alternative 2 would not reduce the potential for erosion of the drainage channel into the landfill and would not reduce potential impacts to ground water from percolation of rainwater through those areas of Landfill No. 1 that are not adequately covered.

For Landfill No. 6, Alternative 2 would provide long-term effectiveness in reducing exposures to landfill contents through access restrictions and land-use restrictions. There was no unacceptable health risk associated with Landfill No. 6, and no ground water contaminated above ARARs. The existing cover over the landfill prevented the landfill contents from significantly impacting underlying ground water.

For both landfills, permanency and reliability would be evaluated through long-term ground-water monitoring and maintenance of the existing landfill soil cover.

Alternative 3 (applicable to Landfill No. 1 only) provides long-term effectiveness in reducing risk due to exposure of contaminants in the landfill, and significantly reduces the potential for landfill contents to impact ground-water quality. Access restrictions would deter unauthorized access to the site. Installing additional cover and improving existing cover would effectively contain the contents of the landfill and reduce the potential for exposure to contaminants. Providing positive drainage off the site would also reduce pounding on the landfill and further reduce the potential for infiltration. Erosion of the drainage channel into the landfill will be limited by realigning and lining the channel. The development and maintenance of a vegetated area would limit erosion of the earth cover. Permanency and reliability would be evaluated through long-term ground-water monitoring and maintenance of the existing landfill cover and vegetation.

2.8.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

The assessment of this criterion involves considering the anticipated performance of specific treatment technologies an alternative may employ.

Alternatives 1 and 2 do not reduce toxicity, mobility, or volume of contamination. Alternative 3 reduces the mobility of contaminants in the soil by preventing erosion of the drainage channel into the landfill and reducing infiltration and potential wind-blown contamination (through installation of a cover); however, treatment of the contamination is not being proposed.

2.8.5 Short-Term Effectiveness

The assessment of this criterion considers the effectiveness of alternatives in maintaining protection of human health and the environment during the construction of a remedy until response action objectives have been met.

It is not anticipated that the proposed alternatives would significantly impact worker or community health and safety during the implementation period. Alternatives 2 and 3 may impact community and worker health and safety through dust emissions during the initial construction phase. The impact could be minimized through dust mitigation.

Alternatives 2 and 3 may create a short-term increase in risk during remedial activities due to the inhalation exposure pathway. Disturbance of surface soil during earthwork could result in exposure to workers. The use of personal protective equipment and dust mitigation measures during construction would minimize this potential impact. Alternative 3 could temporarily increase the opportunity for erosion of

the disturbed soils, although erosion and sediment control measures will help to minimize this adverse impact.

2.8.6 Implementability

The assessment of this criterion considers the administrative and technical feasibility of implementing the alternatives and the availability of necessary goods and services for implementation of the response action.

Alternative 1 requires no implementation because of the No Action scenario.

Alternative 2 requires no special or unique activities and could be implemented using locally available materials and contractors. Long-term monitoring would indicate whether additional action would need to be implemented in the future.

Alternative 3 could be implemented with standard construction equipment, materials, and methods. The availability of an on- or off-Base supply of cover material, and the design of channel improvements require further consideration during the Remedial Design Analysis. If required, wetlands mitigation (as a result of potential drainageway modifications) could also be implemented with standard construction equipment, materials, and methods. Land use (or deed) restrictions could be implemented at EAFB using various administrative means.

2.8.7 Cost

The assessment of this criterion considers the capital and operation and maintenance (O&M) costs associated with each of the alternatives. Alternatives are evaluated for cost in terms of both capital costs and long-term O&M costs necessary to ensure contained effectiveness of the alternatives. Capital cost includes the sum of the direct capital costs (materials and labor) and indirect capital costs (engineering, licenses, permits). Long-term O&M costs include labor, materials, energy, equipment replacement, disposal, and sampling necessary to ensure the future effectiveness of the alternative. The objective of the cost analysis is to evaluate the alternatives based on the ability to protect human health and the environment for additional costs that may be incurred. Cost estimates do not include yearly escalation adjustments. A summary of the costs for each alternative is as follows:

Alternative No. 1 (No Action)

Total Capital Costs	\$0
Total Annual (Sampling/Analysis) Costs=\$0	
30-Year Present Value for Annual Costs	\$0
Annual Cost = \$0	
Years = 30	
Discount Rate = 5%	
TOTAL 30-Year Present Value	\$0

Alternative No. 2 - Landfill No. 1 (Institutional Controls)

Total Capital Costs	\$132,100
Total Annual (Sampling/Analysis/O&M) Costs - Years 1-5 =	\$107,350
Total Annual (Sampling/Analysis/O&M) Costs - Years 6-30 =	\$55,650
30-Year Present Value for Annual Costs	\$1,079,300
Annual Cost - Years 1-5 = \$107,350	
Annual Cost - Years 6-30 = \$55,650	
Years = 30	
Discount Rate = 5%	
TOTAL 30-Year Present Value	\$1,211,400

Alternative No. 2 - Landfill No. 6 (Institutional Controls)

Total Capital Costs	\$31,200
Total Annual (Sampling/Analysis/O&M) Costs - Years 1-5 =	\$18,000
Total Annual (Sampling/Analysis/O&M) Costs - Years 6-30 =	\$9,500
30-Year Present Value for Annual Costs	\$182,800
Annual Cost - Years 1-5 = \$18,000	
Annual Cost - Years 6-30 = \$9,500	
Years = 30	
Discounts Rate = 5%	
TOTAL 30-Year Present Value	\$214,000

Alternative No. 3 - (Single Layer Earth Cover/Institutional Controls)* (Landfill No. 1 only)

Total Capital Costs	\$693,400
Total Annual (Sampling/Analysis/O&M) Costs - Years 1-5 =	\$107,350
Total Annual (Sampling/Analysis/O&M) Costs - Years 6-30 =	\$55,650
30-Year Present Value for Annual Costs	\$1,079,300
Annual Cost - Years 1-5 = \$107,350	
Annual Cost - Years 6-30 = \$55,650	
Years = 30	
Discount Rate = 5%	
TOTAL 30-Year Present Value	\$1,772,700

Alternative No. 3 - (Multi-Layer Earth Cover/Institutional Controls)* (Landfill No. 1 only)

Total Capital Costs	\$3,187,600
Total Annual (Sampling/Analysis/O&M) Costs - Years 1-5 =	\$107,350
Total Annual (Sampling/Analysis/O&M) Costs - Years 6-30 =	\$55,650
30-Year Present Value for Annual Costs	\$1,079,300
Annual Cost - Years 1-5 = \$107,350	
Annual Cost - Years 6-30 = \$55,650	
Years = 30	
Discount Rate = 5%	
TOTAL 30-Year Present Value	\$4,266,900

* NOTE: For Alternative 3, single or multi-layer is dependent on results of the pre-design study. Under the single layer option, two feet of cover material will be placed over 2-3 acres of rubble in the western portion of the landfill that are currently exposed. Over the remaining areas of the landfill, low areas will be filled and the entire area graded to proved positive drainage off the site. Under the multi-layer option, the reduced permeability cover would be placed over the entire area of the landfill. Costs for channel improvements are not included in Alternative 3 and need-to be further evaluated in the Remedial Design Analysis.

2.8.8 State Acceptance

The assessment of this criterion considered the State's preferences for or concerns about the alternatives.

The State concurs with the selected remedy. The State provided comments on the Remedial Investigation, Feasibility Study, and Proposed Plan. In accordance with the requirements of the NCP, the State of South

Dakota was also provided the opportunity to review and comment on the ROD. As a result of that review and after incorporating adequate responses to the comments into the respective documents, the State concurred with the remedy.

2.8.9 Community Acceptance

Comments offered by the public were used to assess the community acceptance of the proposed alternative. The community expressed their concerns about the selected remedy during the public comment period. The questions and concerns of the community are discussed in detail in the Responsiveness Summary which is Appendix B of the ROD.

2.9 SELECTED ALTERNATIVE

Based on the requirements of CERCLA, comparative analysis of the nine criteria, public comments, and in consultation with EPA and the State, the Air Force has determined that the selected alternative for Landfill No. 1 is Alternative 3, Earth Cover/Institutional Controls. This alternative includes institutional controls, storm-water channel realignment and lining, in conjunction with physical modification of the OU to reduce potential risk. The selected alternative for Landfill No. 6 is Alternative 2, Institutional Controls. This alternative uses access restrictions, monitoring, and other controls to reduce potential risk. Five-year reviews of the remedies for both landfills would be required because potential contaminants will remain above health-based levels following completion of installation of the landfill cover. If the five-year reviews of the remedies indicate that conditions at landfills have changed, certain aspects of the selected remedies may be modified to reflect these changes.

For Landfill No. 1, major components of Alternative 3 are:

- Installing an earth cover over the area of attainment at Landfill No 1.
- Institutional controls to restrict future use of the operable unit.
- Realignment and lining of the storm-water channel.
- Providing for long-term monitoring to identify development of future risks associated with the operable unit. Providing long-term maintenance for the remedial actions taken at the operable unit.

Each of these items are discussed below.

Installation of Soil Cover

A pre-design study would be conducted to verify the defined limits of the landfill and determine the type of cover needed. It is anticipated that a single-layer earth cover that meets the State landfill closure requirements will be used. The cover material must be capable of sustaining vegetation. Information from the remedial investigation indicates that approximately two feet of cover material exist over most of the landfill, except in the western portion of Landfill No. 1. Borings drilled during the pre-design study would be used to determine the quantity of material required to construct a cover of the required thickness. The pre-design study would also be used to determine the type of cover needed to reduce infiltration of precipitation through the landfill and ensure continued compliance with the MCLs.

The area of attainment would be filled, graded, and contoured to maintain stability, eliminate slumping, settling, or pounding of water above previously active disposal areas, and to provide positive drainage off the landfill area.

Also under this alternative, the following activities would take place:

- Stabilize, realign, and line the banks of the existing storm-water channel in the western portion of Landfill No. 1 with rip-rap or other energy dissipating material. This activity is dependent upon the pre-design study.
- Level existing rubble piles.
- Seed under-vegetated areas and areas disturbed by new construction and cover placement.

If the discharge of fill material into a water body cannot be avoided, the use of appropriate and practicable mitigation measures to minimize the adverse impact to the aquatic ecosystem will be required.

Appropriate mitigation measures may be implemented during the remedial action. If lining this channel as part of Alternative 3 results in adverse impacts to wetlands at OU-2, an alternate area will be chosen for construction of a new wetland for the mitigation purposes.

Institutional Controls

Institutional controls would be implemented to prevent human exposure to contaminated soil and ground water. These controls will include: (1) issuing a continuing order to restrict onsite worker access to contaminated soil, and restrict or control temporary construction activities unless proper protective equipment is worn; (2) filing a notice to the deed detailing the restrictions of the continuing order and ground-water well restrictions; and (3) a covenant to the deed in the event of property transfer.

The continuing order would be issued by the Installation Commander to restrict access to or disturbance of the landfills as long as Ellsworth AFB owns the property. Specifically, it would:

- Restrict or place limitations on the installation of any new underground utilities or other construction activities in the area of the landfills; thus preventing accidental exposures to construction workers.
- Provide for the use of protective equipment, in the event that access through the landfill cover is required.
- Require that the integrity of the landfill covers are maintained. Limit future land uses to non-intrusive activities only. Maintenance of the landfills will require development of standard operating procedures (SOPs) to provide for inspections and repairs. To assist with the institutional controls, a fence may be placed around Landfill No. 1 and authorized personnel would have access through a locked gate. Access would only be allowed to perform landfill monitoring and maintenance activities. Warning signs would be posted at both landfills to deter unauthorized access.

The continuing order also would mandate that, if the landfill covers were ever removed or destroyed, the area of attainment would be re-evaluated to determine the need for a replacement cap or other remedial action.

Continuing order requirements will be in effect as long as the property is owned by Ellsworth AFB. In the case of the sale or transfer of property within OU-2 by the United States to any other person or entity, the Air Force will place covenants in the deed which will restrict access and prohibit disturbance of the landfill or the remedial action without approval of the United States. These covenants will be in effect until removed upon agreement of the State of South Dakota, the U.S. Environmental Protection Agency, and the U.S. Air Force or their successors in interest. The Air Force will also include in the deed the covenants required by section 120(h)(3) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which include (1) a warranty that the United States will conduct any remedial action found to be required by law after the date of the transfer; (2) a right of access in behalf of EPA and the Air Force or their successors in interest to the property to participate in any response or corrective action that might be required after the date of transfer. The right of access referenced in the preceding sentence shall include the State of South Dakota for purposes of conducting or participating in any response or corrective action that might be required after the date of transfer.

Long-Term Monitoring and Maintenance

A long-term monitoring program will be developed and implemented during remedial action and is subject to approval of both EPA and SDDENR. Contaminant concentrations in the ground water will be monitored to evaluate the effectiveness of the existing landfill cover and to determine if ground-water contaminants have been transported beyond the landfill boundaries.

A maintenance program would be implemented to ensure the long-term integrity on the remedial action and landfill conditions would be maintained. The maintenance program would include development of (SOPs) to provide for inspections, repairs, and general maintenance of the landfills.

For Landfill No. 6, major components of Alternative 2 are:

- Institutional controls to restrict future use of the operable unit.
- Providing for long-term monitoring to identify development of future risks associated with the operable unit. Providing long-term maintenance for the remedial actions taken at the operable unit.

The details of the items listed above are the same as to the respective items discussed for the selected alternative for Landfill No. 1 except that the access restrictions for Landfill No. 6 will consist of installing restricted access and warning signs only, not installing a fence. A fence may be installed around Landfill No. 6 if it is determined it is needed during the remedial design.

These alternatives for Landfill No. 1 and 6, respectively, will meet the remedial action objectives and reduce the potential risk for OU-2 by reducing the potential for future exposure to contaminants in the surface soils and by reducing the mobility of potential contaminants in the landfills.

For Landfill No. 1, Alternative 3 would achieve significant risk reduction by limiting exposure to landfill materials and to contaminants present in surface soils and would reduce the potential for future movement of contaminants in the ground water beneath the landfill. For Landfill No. 6, institutional controls and long-term maintenance of the existing cover would reduce the potential for erosion and future exposures to landfill contents. The selected alternatives will be protective of human health and the environment and will comply with ARARs.

2.10 STATUTORY DETERMINATIONS

The selected remedies meet the statutory requirements of CERCLA as amended by SARA. These requirements include protection of human health and the environment, compliance with ARARs, cost effectiveness, utilization of permanent solutions and alternative treatment technologies to the extent practicable. The statutory preference of treatment is not satisfied; however, the selected alternative(s) is the presumptive remedy (containment) developed by EPA for landfills. Containment, by definition, does not attempt to reduce the toxicity or volume of potentially hazardous materials; rather, it reduces the likelihood of exposure to these materials by preventing the movement of materials beyond the boundaries of the landfills and preventing direct contact with landfill materials. The selected remedies represent the best balance of tradeoffs among the alternatives considered, with respect to pertinent criteria, given the scope of the action.

The manner in which the selected remedy meets each of these requirements is discussed in the sections below.

2.10.1 Protection of Human Health and the Environment

Implementation of the presumptive remedy (containment by covering) strategy for landfills has been shown by EPA to meet the remedial action objectives and protect human health and the environment by preventing (1) direct contact with landfill contents and (2) ingestion of surface soils and sediments. Specifically, the cover alternative for Landfill No. 1:

- Eliminates exposure to landfill contents by installing an earth cover.
- Reduces the potential infiltration of contaminants to the ground water.
- Reduces the potential for erosion into the landfill by improving the drainage channel within the boundaries of the landfill.
- Prevents unauthorized access to the area by installing a perimeter fence and posting restricted access signs.
- Provides for long-term monitoring of ground water to identify potential future risks associated with OU-2.
- Places land and ground-water use restrictions on the landfill.

Specifically, the institutional controls alternative for Landfill No. 6:

- Deters unauthorized access to the area by posting restricted access and warning signs.
- Provides for long-term monitoring of ground water to identify potential future risks associated with OU-2.
- Places land and ground-water use restrictions on the landfill.

2.10.2 Compliance with ARARs

Alternative 3 for Landfill No. 1 will meet State landfill closure requirements by providing the required

amount of cover over the landfill, site improvements, access and land/ground-water use restrictions, and long-term monitoring/maintenance. Landfill No. 6 already meets minimum cover requirements and Alternative 2 will comply with additional State landfill closure requirements. The OU-2 RI concluded that contaminated ground water has not moved beyond the limits of Landfill No. 1; therefore ground-water ARARs are met at the boundaries of the landfill. The RI also concluded that the ground water beneath Landfill No. 6 has not been adversely impacted, therefore ground-waters ARARs are also met at this landfill. Mitigation of adversely affected wetlands may be required. Additional information about ARAR compliance is contained in Section 2.8.2.

2.10.3 Cost Effectiveness

The selected remedies for Landfill Nos; 1 and 6 respectively, provide overall effectiveness in reducing human health risks relative to its costs. The presumptive remedy process ensures cost effective remedies are chosen. The landfill cover ensures containment of the landfill contents. Site specific conditions identified during the remedial investigations will be used to determine the cover type considered for Landfill No. 1. Additional information will be developed during the pre-design study to determine whether a single-layer or more costly multi-layer cover would be needed.

2.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Extent Possible

EPA has established that installing a proper cover has proven effective in containing landfill contents. The alternatives for both landfills provide long-term prevention of exposure to potential landfill material, prevent unauthorized access, and provide for long-term ground-water monitoring to detect potential movement of chemicals from the area. A five-year review of the selected remedy will be performed due to the uncertainty of fully characterizing landfill contents. The review will be conducted no less often than every five years after the signing of the ROD to ensure the remedy continues to provide adequate protection of human health and the environment. Results of the review will be used to determine if modification of any or all parts of the selected remedies will be required.

2.10.5 Preference for Treatment as a Principal Element

Treatment of the landfill contents is not supported based on the findings of the RI for OU-2. No identifiable hot spots were detected that would warrant removal and/or separate treatment. The risks associated with OU-2 can be addressed by eliminating exposure to the landfill contents by installing a cover and restricting access.

2.11 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected actions for Landfill No. 1 and Landfill No.6 at OU-2, the cover alternative and institutional controls alternative respectively, are similar to the preferred alternative presented in the Proposed Plan for OU-2 remedial action. However, there has been a change to that part of the alternative relating to the drainage channel located in the western portion of Landfill No. 1. (The Air Force had initially proposed to realign the channel as part of a Basewide storm-water improvement project. Because the proposed realignment may have disturbed fill and also impacted wetlands areas in the drainage channel, plans for improvement of this channel were removed from the storm-water project.)

In addition to the installation of a landfill soil cover, Alternative 3 (the preferred alternative for Landfill No. 1) has been modified to include the following channel improvements: realignment, bank stabilization, and lining. These improvements will reduce the potential for the channel to erode into the landfill and possibly transport contaminants downstream and off-Base. The type of improvements and lining required will be considered during the remedial design/remedial analysis phase. For purposes of the cost estimate, limited channelization was considered and rip-rap lining was used along the length of the channel running through Landfill No. 1 and 100 feet upstream and downstream of the landfill boundaries.

There has also been a change to the preferred alternative for Landfill No.6. The frequency of monitoring at Landfill No.6 has been reduced because there is no unacceptable risk associated with this landfill. EPA and the State have agreed with this reduced monitoring. The actual frequency of sampling will be determined in the remedial design/remedial analysis; however, it is estimated that annual monitoring will be conducted for the first 5 years with biannual monitoring for the next 25 years. This is the sampling frequency used to develop the revised cost estimate. The reduced monitoring will result in a significant cost savings for the remedy at Landfill No. 6. Also, the fencing requirement for Landfill No. 6 has been removed and is not included in the cost estimate. Access control will be maintained by posting warning signs.

TABLE 2-1 EVALUATION OF FEDERAL AND STATE ARARS THAT APPLY TO OU-2, ELLSWORTH AFB, SOUTH DAKOTA

A. Potentially Applicable of Relevant and Appropriate Federal Standards, Requirements, Criteria and Limitations					
Standard Requirement, Criteria or Limitation	Citations	Description	ARAR Type	Applicability	
Safe Drinking Water Act of 1986	42 USC 300g				
National Primary Drinking Water Regulations	40 CFR Part 141.11-12	Specifies maximum chemical contaminant levels (MCLs) of public water systems.	Chemical	Relevant and appropriate for Federal Class II aquifer.	
National Secondary Drinking Water Standards	40 CFR Part 143.03	Establishes secondary maximum contaminant levels (SMCLs) for public water systems. These are federally non-enforceable standards which regulate contaminants in drinking water that primarily affect the qualities.	Chemical	Relevant and appropriate.	
Maximum Contaminant Level Goals	40 CFR Part 141.50& Pub. L. No.99-330,100 stat.642 (1986)	Establishes drinking water quality goals set at levels of unknown or anticipated adverse health effects, with an adequate margin of safety.	Chemical	Relevant and appropriate.	
Clean Water Act of 1977	33 USC 1251-1376				
Water Quality Criteria	40 CFR Part 131	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Chemical	Relevant and appropriate. Aquifer may be a Federal Class IIA (discharge to surface water).	
Clean Air Act of 1983	42 USC 7401				
National Primary and Secondary Ambient Air Quality Standard	40 CFR Par 50.1-6,8,9,11,12, and Appendices A,H,J,K	Established national primary and secondary ambient air quality standards to protect public health and welfare.	Action	Relevant and Appropriate	
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61.01	Establishes national primary and secondary air pollutants	Action	Relevant and Appropriate	
Solid Waste Disposal Act as amended by Resource Conservation and Recovery Act by 1976	42 USC 6901				
Solid Waste Disposal Facility Criteria	40 CFR Parts 257 and 258	Sets forth revised minimum federal criteria for Municipal Solid Waste Landfills (MSWLFs) for existing and new units	Action	Relevant and appropriate for addressing landfill closure performance standards	
Land Disposal Restriction	40 CFR Part 268	Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which a prohibited waste due to treatment. may continue to be land disposed April 1996	Action	Relevant and Appropriate. Alternatives may include the disposal of residual	

Standard Requirement, Criteria, of Limitation	Citations	Descriptions	ARAR Type	Applicability
Guidelines for the Land Disposal of Solid Waste	40 CFR Part 241 100-213	Establishes requirements and procedures for the disposal of solid waste.	Action	Relevant and appropriate for meeting landfill closure performances guidelines.
Resource Conservation and Recovery Act of 1976				
Hazardous Waste Management System: General	40 CFR Part 260	Establishes definitions as well as procedures and criteria for modification or revocation of any provision in 40 CFR Parts 260-265	Action	Applicable for identifying hazardous waste during soil placement at OU-2.
Identification and Listing of Wastes	40 CFR Part 261	Defines those solid wastes which are subject to regulations as hazardous wastes under 40 CFR Parts 262-265	Action	Applicable for identifying hazardous waste during soil placement at OU-2.
Standards Applicable to Generators of Hazardous Wastes	40 CFR Part 262	Establishes standards for generators of removal or offsite transport of a hazardous material.	Action	Applicable to alternatives relating to
Standards Applicable to Transporters of Hazardous Wastes	40 CFR Part 263	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 CFR Part 262	Action	Applicable for any transport of hazardous materials offsite.
Standards for Owners and Operators of Hazardous Waste TSDF's	40 CFR Part 264	Establishes standards for acceptable hazardous waste management.	Action	Relevant and Appropriate for performances guidelines for landfill closure.
Standards for Owners and Operators of Hazardous Waste TSDF's with Interim Status.	40 CFR Part 265	Establishes standards for acceptable hazardous waste management during interim closure.	Action	Relevant and Appropriate for performance guidelines for landfill
Toxic Substances Control Act (TSCA)	40 CFR Part 761.1	Substances regulated under this rule include, but are not limited to, soils and other materials contaminated as a result of spills	Action	Applicable
Executive Order on Floodplains Management	Exec. Order No. 11,958 40 USC 7401 40 CFR 6.302(b) & Appendix A	Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists	Action/Location	Relevant and Appropriate OU-2 has identified wetland area adjacent to the site.
Executive Order on Protection of Wetlands	Exec. Order No. 11,990 40 CFR 6.302(a) & Appendix A	Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists	Action/Location	Relevant and Appropriate. OU-2 has identified wetland areas adjacent to the site.

B. Potentially Applicable or Relevant and Appropriate State Standards, Requirements, Criteria, and Limitations

Standard Requirement, Criteria or Limitation	Citations	Description	ARAR Type	Applicability
South Dakota Air Pollution Control Regulations	74:26:01:09, 24, 25, 26-28	Establishes permit requirements for construction, amendment, and operation of air discharge services	Action	Relevant and Appropriate
South Dakota Waste Management Regulations	74:27:03:11	Defines requirements for closure of solid waste disposal facilities	Action	Relevant and Appropriate
South Dakota Waste Management Regulations	74:26:03:04	Establishes requirements for disposal of hazardous waste in sanitary landfills	Action	Relevant and appropriate for landfill closure performance guidelines.
South Dakota Waste Management Regulations	74:27:03:11	Defines requirements for closure of solid waste disposal facilities	Action	Relevant and appropriate for landfill closure performance guidelines.
South Dakota Waste Management Regulations	74:27:15	Establishes standards for landfill closure and postclosure monitoring	Action	Relevant and appropriate
South Dakota Waste Management Regulations	74:28:24:01	Establishes standards for transporters of waste	Action	Relevant and appropriate
South Dakota Water Quality Standards	74:03:04:02, 10	Defines use of Boxeleder Creek and certain tributaries.	Action	Relevant and Appropriate
South Dakota Remediation Criteria for Petroleum-Contaminated Soils	74:03:32, 33	Establishes requirements for the remediation of soil contaminated with petroleum products.	Chemical	Relevant and appropriate for evaluating acceptable levels of petroleum products in the soil.
South Dakota Water Quality Standards	74:03:04:02, 10	Defines use of Boxeleder Creek and certain tributaries.	Action	Relevant and Appropriate
South Dakota Ground Water Standards	74:03:15	Defines ground water classifications by beneficial use and sets chemical standards.	Chemical	Relevant and appropriate in evaluating the beneficial use of impacted groundwater.

APPENDIX A

3.0 LIST OF ACRONYMS AND ABBREVIATIONS

ACC:	Air Combat Command
AFB:	Air Force Base
ARARs:	Applicable or Relevant and Appropriate Requirements
BTEX:	benzene, toluene, ethylbenzene, xylene
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
COC:	Chemicals of Concern
CRP:	Community Relations Plan
CWA:	Clean Water Act
EAFB:	Ellsworth Air Force Base
EPA:	Environmental Protection Agency
FAWQ:	Federal Ambient Water Quality
IRP:	Installation Restoration Program
MCL:	Maximum Contaminant Levels
µg/l:	Micrograms per liter
mg/l:	Milligrams per liter
NCP:	National Oil and Hazardous Substances Contingency Plan
NPL:	National Priorities List
OU:	Operable Unit
PAH:	Polynuclear Aromatic Hydrocarbon
ppm:	Parts per million by weight
RA:	Remedial Action
RAB:	Restoration Advisory Board
RAOs:	Remedial Action Objections
RCRA:	Resource Conservation and Recovery Act
RI/FS:	Remedial Investigation/Feasibility Study
ROD:	Record of Decision
SARA:	Superfund Amendments and Reauthorization Act
SACM:	Superfund Accelerated Cleanup Model
SVOC:	Semivolatile Organic Compound
TCE:	Trichloroethylene
TPH:	Total Petroleum Hydrocarbons
USACE:	United States Army Corps of Engineers
USAF:	United States Air Force
VOC:	Volatile Organic Compound

APPENDIX B

Responsiveness Summary Remedial Action at Operable Unit Two Ellsworth Air Force Base, South Dakota

1. Overview

The United States Air Force (USAF) established a public comment period from August 8 to October 16, 1995 for interested parties to review and comment on remedial alternatives considered and described in the Proposed Plan for Operable Unit Two (OU-2). The Proposed Plan was prepared by the USAF in cooperation with the U.S. Environmental Protection Agency (USEPA) and the South Dakota Department of Environment and Natural Resources (SDDENR).

The USAF also held a public meeting at 6:30 p.m. on September 26, 1995 in the 28th Bomb Wing Auditorium at Ellsworth Air Force Base (EAFB) to outline the proposed remedy to reduce risk and control potential hazards at Operable Units 1, 2, and 4.

Some of the public comments pertained to the selected remedies in the Proposed Plans for all the operable units. Rather than attempting to separate out the comments which pertained to an individual operable unit, one Responsiveness Summary was prepared to address all the comments for all the operable units.

The Responsiveness Summary Provides a summary of comments and questions received from the community at the public meeting and during the public comment period as well as the USAF's response to public comments.

The Responsiveness Summary is organized into the following sections:

- Background on Community Involvement
- Summary of Comments and Questions Received During the Public Comment Period and USAF Responses
- Remaining Concerns

For OU-2, Landfill No. 1, the selected remedy includes an earth cover with institutional controls and consists of the following major components:

- Constructing an earth cover, capable of sustaining perennial vegetation, over those areas of the landfill that are not adequately covered. Filling in low areas and grading the entire landfill area to provide for positive drainage off the site;
- Institutional controls for the landfill area;
- Long-term ground-water monitoring; and,
- Long-term maintenance of soil cover.
- Realignment and lining of the storm-water channel.

For OU-2, Landfill No.6, the selected remedy is institutional controls and includes the following major components:

- Institutional controls for the landfill area;
- Long-term ground-water monitoring; and,
- Long-term maintenance of existing cover.

2. Background on Community Involvement

On August 30, 1990 EAFB was listed on the USEPA's National Priorities List (NPL). A Federal Facilities Agreement (FFA) was signed in January 1992 by the Air Force, EPA, and the State and went into effect on April 1, 1992. The FFA established a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions for EAFB.

Community relations activities that have taken place at EAFB to date include:

- FFA process. After preparation of the FFA by the USAF, EPA, and SDDENR, the document was published for comment. The FFA became effective April 1, 1992.
- Administrative Record. An Administrative Record for information was established in Building 8203 at EAFB. The Administrative Record contains information used to support USAF decision-making. All the documents in the Administrative Record are available to the public.
- Information repositories. An Administrative Record outline is located at the Rapid City Library (public repository).
- Community Relations Plan (CRP). The CRP was prepared and has been accepted by EPA and the State of South Dakota and is currently being carried out. An update to this plan will be prepared in 1996.
- Restoration Advisory Board (RAB). The RAB has been formed to facilitate public input in the cleanup and meets quarterly. In addition to USAF, EPA, and South Dakota oversight personnel, the RAB includes community leaders and local representatives from the surrounding area.
- Mailing list. A mailing list of all interested parties in the community is maintained by EAFB and updated regularly.
- Fact sheet. A fact sheet describing the status of the IRP at EAFB was distributed to the mailing list addressees in 1992.
- Open house. An informational meeting on the status of the IRP and other environmental efforts at EAFB was held on May 6, 1993. An open house was held November 16, 1995 in conjunction with the Restoration Advisory Board meeting. Information on the status of environmental efforts at EAFB was provided at the open house.
- Newspaper articles. Articles have been written for the base newspaper regarding IRP activity.

The Proposed Plan for this remedial action was distributed to the mailing list addressees for their comments and additional copies of the Proposed Plan were available at the September 26, 1995 public meeting. A transcript of comments, questions and responses provided during the public meeting was prepared.

3. Summary of Comments and Questions Received During the Public Comment Period and USAF Responses

Part I - Summary and Response to Local Community Concerns

Review of the written transcript of the public meeting did not indicate community objections to the proposed remedial action. No written comments were received during the public comment period.

The majority of the comments received during the public meeting were in the form of questions about the remedial investigation findings, the remedial action; i.e., what would be done, how it would be done, and what effects the action might have. In addition, one question addressed purchase of off-Base property. Representatives of the USAF were available to provide answers to the questions and also provided an overview presentation during the meeting to describe the proposed actions.

Part II - Comprehensive Response to Specific Technical, Legal and Miscellaneous Questions

The comments and question below, pertaining to OU-2, have been numbered in the order they appear in the written transcript of the September 26, 1995 public meeting.

Comment 1. Jan Deming

Asked about whether deed restrictions were included in Alternative 3 for OU-2, what deed restrictions were, and whether they will apply to private land.

Response 1: Deed restrictions restrict land use in the event of a transfer of ownership of the land. The remedial action under the Record of Decision for OU-2 only addresses the landfills, which are Air

Force property. In the event of transfer of Air Force property, restrictions will be placed on the deed for Air Force property at OU-2. Since the remedial action under Alternative 3 for OU-2 does not address property beyond the Base boundary, deed restrictions for OU-2 do not apply to private property.

Comment 2. Jan Deming

Asked about whether the remedial alternative for off-Base ground water would include any clean up of soil in the off-Base area.

Response 2: The contaminated soil is all within the Base boundary. The remediation in the off-Base area is aimed at ground water. The contamination carried off-Base by the flowing ground water. Deeper soils within the ground-water zone are in contact with the contaminants. When the off-Base ground water is cleaned, the deeper soils will also be cleaned.

4. Remaining Concerns

Based on review of the transcript of the oral comments received during the public meeting, there are no outstanding issues associated with implementation of the proposed remedial action.